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Using Cases As A Teaching Tool In IS Education

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ABSTRACT

Educators use many methods in their classrooms to aid in teaching. One commonly used method of instruction is the use of cases as a teaching tool in IS education. Cases can allow students to develop high-order reasoning skills, bring real world examples into the classroom, allow students to learn by doing, bring organizational impacts, social values, and ethical issues to the forefront of discussion, and include realistic content, objectives and knowledge transfer. As part of its mission to support Information Systems (IS) education, JISE is pleased to publish this special issue devoted to IS teaching cases. The twelve teaching cases in this issue are divided into five IS areas. These teaching cases may be copied and used by IS faculty for any teaching purposes.

1. INTRODUCTION

talk to me and I will listen
show me and I will observe
involve me and I will learn
proverb

There is a longstanding view that the practice of teaching should involve the teaching of practice. Most importantly the perceived distance between teaching methods and practical contexts should be as short as possible. One widely adopted vehicle for this objective is the **case method** where the opportunity is presented to reduce the divide between simulation (teaching) and reality (practice). The use of case studies in college and university curricula is of course not a new paradigm. Business schools have had a tradition of using this approach for decades to engage students in their field. Harvard University (USA), Stanford University (USA), the University of Western Ontario (CN), and Cranfield (UK) are world leaders in developing cases in business subjects. As a result of their widespread and enthusiastic use of the 'case method' they have both stimulated the adoption of cases within world wide universities. There is no doubt that the use of cases for Information Systems teaching is a recognized teaching tool, and continues to expand.

However, the use of cases in IS classes may be viewed with suspicion and skepticism by some educators. Is the 'case method' really proven to support pedagogic advances or, for example, is there just a commercial expediency from the suppliers involved? The answer is clearly within the experience of educators who claim significant results from case work and its consequent simulated reality.

Teaching cases have been recognized by many IS educators as an important pedagogical tool. The Journal of Information Systems Education (JISE) published its first

teaching case in the Winter 2002 issue (Cappel, 2002). Since that time, JISE has continued to receive, review, and publish high quality teaching cases that can be used in IS classes. This Special Issue on IS Teaching Cases reflects the view that teaching cases are a valuable teaching tool for IS educators. All of the contributors are experienced educators who advocate the 'case method' and its real learning advantages.

2. CASE TEACHING METHOD

The choice and implementation of a specific case is related to three broad questions: is it relevant to the topic; is it substantive and complex enough to reflect a real situation; and is it stimulating enough to invoke discussion and subsequent learning (involve me concept)? The overriding principle is the practicality of the theoretical formulations involved. The case method clearly cannot solve all of the teaching and learning problems in IS education. Great care is required to introduce a case, its main constituents, the IS problem in context, and a realistic and valid illustration of any proposed solutions. There is a balance here between a simple observation and the complex environment issues to be considered. Consequently the *design* of the case is critical if learning is to be achieved through effectively involving students in the process. If the case is deficient, involvement will be minimized and learning will not occur. There are obvious unique and sophisticated competencies required in case design for both faculty and students in this respect.

The case method is not the sole panacea of teaching and learning problems in IS education. The case method of teaching requires considerable effort and planning from students and faculty. For students to be prepared to discuss a case, they must have read the case and spent time studying the issues associated with the case. Faculty must develop teaching skills in the use this method of teaching. The case method is clearly not the easiest method of teaching, but it can be immensely rewarding and valuable when used properly and when good teaching cases are available.

3. CHARACTERISTICS OF GOOD TEACHING CASES

There are many positive learning aspects with the use of cases in information technology classes. However, for a teaching case to be effective, it must have certain characteristics. We believe that all of the cases presented in this Special Issue contain these characteristics.

3.1 Allow Students to Develop High-Order Reasoning Skills

The case method of teaching seems to be an ideal way to develop higher-order reasoning skills. This can be ideal for graduate or upper-level classes, as these students usually have the maturity to develop higher-order reasoning. High-order reasoning allows students to integrate multiple concepts and bring value and judgment into the learning process. Finally, high-order reasoning usually is associated with participatory learning, where student and teacher interchange ideas.

3.2 Bring Real World Examples into the Classroom

Most cases are usually based on real world scenarios. Using cases allows the instructor to bring these real world examples into the classroom. Students are able to see the issues and dilemmas of the real world. The problem is that there is many times no "answer" to the situation. These real world scenarios allow for rich discussions of the multiple concepts and dilemmas that people actually face.

3.3 Allow Students to Learn by Doing

As the proverb in the Introduction stated, "involve me and I will learn." The case method allows students to get involved in the scenario and to learn by doing. The problem here is that many students do not get involved in the case. This is unfortunate and is a dilemma for the instructor. How do you get as many students as possible involved? By using cases in the classroom, students can get involved and can learn by doing.

3.4 Bring Organizational Impacts, Social Values, and Ethical Issues to the Forefront

Earlier we said that the case method allows students to integrate multiple concepts. Specifically, these concepts can include organizational impacts, social values, and ethical issues. The cases presented in this special issue do draw on those multiple concepts, especially in the areas of systems analysis and design, e-commerce/e-business, and security/disaster recovery.

3.6 Include Realistic Content, Realistic Objectives and Knowledge Transfer

Good cases must provide realism in the areas of content, objectives, and knowledge transfer (Cappel and Schwager, 2003). Again, the cases in this Special Issue on IS Teaching Cases do include realistic content, realistic objectives, and opportunities for knowledge transfer, if properly used.

4. LIMITATIONS OF THE CASE METHOD

Although we advocate using the case method, we also realize that there are limitations to using this teaching method. Some of these limitations are described below.

4.1 Occasional Use Problems

When cases are used occasionally within a course, they can spice up the subject and show students how their learning impacts on the world. The problem with using cases only occasionally is that neither teachers nor students become comfortable with the method. Can an instructor use one case in a semester long class? How many cases are needed for the instructor and students to be comfortable with this method? These are some good potential areas for future research.

4.2 Information Coverage Problem
When cases become the predominate method of instruction, the question of information coverage becomes an issue. Traditionalists argue that teachers can not cover the same amount of information using cases. Naturally, faculty must be alert to keep the discussion on the subject. To do this, faculty must develop teaching skills many do not now possess. Cases can be used in almost any type of information systems class. This issue includes two or more cases in the following areas: systems analysis and design, database administration, E-Commerce/E-Business, security/disaster recovery, and enterprise resource planning.

4.3 Not for Every Type of Class
The case method is not for all classes. For example, if the class consists of a plethora of facts, figures, and principles then this method is probable not appropriate. Also, classes with specific knowledge transfer, such as programming classes, many not be appropriate for the case method. Instructors must be careful to use this method in classes that are appropriate.

5. CASE STUDIES PRESENTED IN THIS SPECIAL ISSUE

This Special Issue on IS Teaching Cases presents twelve cases. We have categorized the cases by IS topic.

5.1 Systems Analysis & Design/Systems Development
Myers describes a project suitable for use in an upper division course requiring the completion of analysis, design and implementation of a software system. It is especially useful for illustrating multiple cycles through the development process, as well as for integrating key concepts from a number of fundamental knowledge clusters in a typical undergraduate IS program of study. These knowledge clusters include database management, project management, programming principles, and system analysis and design. In the pilot class, students employed use case analysis as well as standard object-oriented techniques such as class diagrams and sequence diagrams. Students followed a modified version of the Team Software Process, with special attention paid to the postmortem following each of two cycles. Teaching tools included the use of a special email address allowing students to converse with the "client."

Cuyler & Schatzberg Part I of this case describes a small MIS department responsible for medical information systems that support an occupational health clinic situated in a major university. Their customers are primarily medical and administrative professionals who, for a long time, have been disappointed with the team and the systems. The environment is rather hostile. A new MIS department head is hired and is in a quandary how to ensure success with major MIS projects that are critical to their medical community customers. This part of the case is suitable for discussion in a single class period, separated from the discussion of Part II, which follows. Part II of the case is intended to highlight the importance of coupling informal (people skills-based) system development techniques with the rigorous formal (technical skills-based) techniques. This part describes the approach of Marty Coles, the new MIS Department head to solve serious, longstanding problems between MIS teams and their customers. Managing end-user application development is also discussed. After discussing Part I, this part of the case is suitable a single class period for either masters or undergraduate students.

Jewels reports, in 1996, that an agreement was made between a well-known beverage manufacturer, Super-Cola Taiwan, (SCT) and a small Australian electrical engineering company, Dag-Brücken ASRS Pty Ltd, (DB), to provide an automated storage and retrieval system (ASRS) facility as part of SCT's production facilities in Asia. Recognizing the potential of their innovative and technically advanced design, DB was awarded a State Premiers Export Award and was a finalist in that year's National Export Awards. The case tracks the development and subsequent implementation of the SCT ASRS project, setting out to highlight how the lack of appropriate IT development processes contributed to the ultimate failure of the project and the subsequent winding up of DB only one year after being honored with these prestigious awards. The case provides compelling evidence of the types of project management incompetence that, from the literature, appears to contribute to the high failure rate in IT projects. For confidentiality reasons, the names of the principal parties are changed, but the case covers actual events documented by one of the project team members as part of his postgraduate studies, providing an example of the special mode of evidence collection that Yin (1994) calls 'participant-observation'.

Gelinas et al describe the United States Treasury eCheck Pilot Project team faced with a major decision regarding the next phase of an important test of a new electronic payment mechanism, which involved participation from the Treasury's Financial Management Service, the U.S. Department of Defense Finance and Accounting Services Division, the Federal Reserve Bank of Boston, and a number of Defense suppliers. An earlier phase of the project had involved two commercial banks, as well: Fleet Boston and Bank of America. Bank of America had withdrawn from the project and Fleet Boston could no longer participate because the market trial had been designed for the participation of two commercial banks. Therefore, it was necessary to redesign the payment process. One solution for a redesigned process had been suggested by Frank Jaffe, the outgoing manager of the eCheck Pilot Test (Jaffe had left Fleet to join a start-up, Clareon, which would develop its own commercial version of the eCheck technology). Another solution had been suggested by Mike Versace, the representative from the Federal Reserve Bank - the case analyzes the respective responses.

5.2 Database Administration

Parker considers the Teton Whitewater Kayak case designed to provide students with a challenging hands-on exercise in relational database design. It is extensive enough to provide a stimulating exercise, but not so large as to be overwhelming. The case can be utilized for a group project in a database management or database design course. The case is sufficiently detailed to challenge students as they apply the design concepts explained in class to a problem that closely simulates a real-world problem. An associated project can be broken into deliverables, or individual components that cover a single task, to make the project more manageable. Some of the suggested deliverables associated with this project include the design of entity-relationship diagrams, normalization of the database schema, table creation, SQL query design, form and report design, and stored procedure and trigger design. The problem was designed to be extensible. For example, while it does into include credit card processing or selling equipment on consignment, those features can be easily added to make the case more complex. The case could even be extended for use in an analysis and design class, as the services provided by the company are presented as a set of processes that can be easily represented in a data flow diagram.

Ballenger presents a real-world end-of-semester project-oriented case study for students enrolled in an introductory database management course. The case consists of a business scenario to provide background information on the need for the application and some of the unique operating characteristics of the elk county pediatric medical center. In addition, narrative information regarding the functional requirements of the medical center is included along with sample data: parents, patients, services performed, diagnosis codes, insurance carriers, and patient history. The case provides sufficient information to design a moderately complex database for the medical clinic. The functional requirements will force students to resolve numerous many-to-many relationships. In addition, several entities have compound unique identifiers resulting in tables with composite primary and foreign keys. The case provides sufficient real-world data to operationalize the database design into a physical database, populate it with data, and then write a series of queries that satisfy the stated reporting requirements of the medical center. The queries vary considerably in terms of complexity, from simple straightforward queries to others that are quite complex and require multiple sub-queries. Several queries are dependent upon parameters entered at runtime. Some queries all students should be able to answer, while others require critical thinking skills to solve. The case was written so that creation of the physical database and queries are not dependent on the student's database management software. Teaching notes containing suggested instructions, a possible entity-relationship model, the resulting physical database, and the solution to the queries are also provided.

5.3 E-Commerce/E-Business

Elam & Becerra-Fernandez describe the sequence of events that led to the establishment of MetalSpectrum, a digital marketplace for the exchange of non-ferrous metals. Compared to the historical establishment of the London Metal Exchange, MetalSpectrum was created for the purpose of redefining the way non-ferrous metals were bought and sold. The case study examines how established companies seek to respond to the threat imposed by disruptive technologies like the Internet. Also critical success factor underlying the success of the Internet venture are discussed in the context of the period marked by the Internet frenzy of 1999-2001.

Wang notes that the popularity of E-business applications, Web-based database application development has become an important topic in the information systems curriculum. There is a need to explore ways to teach such a topic effectively. This case presents a teaching note on the development of an e-business application for Fortune Invest Inc. using Java server technology with Java Database Connectivity to Oracle databases. The teaching case has the following features: 1) complete coverage of the fundamentals of e-business application development; 2) systematic integration of the knowledge in database design, implementation, programming languages, networking, Web development and system analysis; 3) script execution independent of any platforms; and 4) accessible web sites on the Internet with sample code provided. The teaching case was tested in upper division CIS courses in three academic quarters during the past two years at California State University, Los Angeles. The teaching approach emphasizes learning by doing in order to motivate the student and to produce an effective learning outcome.

5.4 Security/Disaster Recovery

Logan & Logan address the 'malware' infection and its organizational and technical consequences. This case study enables students to view the business continuity issues that should drive all security decisions in IT and allow analysis of the organizational and technical issues that impact recovery from a disaster that is caused by a malware infection. Information systems students seldom see case studies that involve the issues of disaster planning and business continuity within the context of what has become an ever-more frequent occurrence: a virus/worm (malware) infection. This case study would be appropriate for either undergraduate or graduate students in courses involving information resource management, MIS or information security.

White & Rae provide an examination of a real world break-in to a Web server through a forensic examination of what happened to the Jing An Telescope Factory (JATF) and a suggested model for preventing such attacks. The case specifically focuses on the "hack" break-in that is commonplace with Web servers and illustrates the well-known mistakes made in the security arrangements by JATF. Select hacking techniques and an overview of

network vulnerabilities, as well as discussions about tools and techniques that security professionals use are discussed in this paper. The authors propose a set of techniques and models that business should follow to guard against similar attacks. Students are encouraged to assess and implement solutions using the tools and techniques presented in the case.

5.5 Enterprise Resource Planning (ERP)

Volkoff notes that the purpose of this teaching case is to help students gain an appreciation of some of the challenges inherent in implementing large software packages such as ERP systems. First it attempts to give a concrete sense of what it means to "configure" software. It then introduces the student to some of the standard dilemmas a company faces trying to make packaged software fit specific business needs. In looking at the gaps between a specific business process and the ERP application's functionality, the case introduces the student to the way in which ERP systems demand structure in the business processes they support, and the resulting tension between managerial control and organizational flexibility. The case also illustrates some of the ways companies try to address the gaps between what they want and what the software offers.

Cowan & Eder discusses the management and control of a large enterprise-wide implementation of an ERP system while the business model and corporate culture were shaping and being shaped by that implementation. In 1995, the Enterprise Networks Systems business unit of AT&T faced a triad of problems caused by its legacy IT infrastructure, including the lack of timely, accurate financial and operating data, looming Y2K issues and systems capacity issues that were beginning to limit growth. A business plan for change was developed and approved. A project team was assembled to replace 25 years of legacy systems architecture (400+ systems) with a new enterprise systems architecture. The team was to act as change agent by supplanting a myriad of business processes and people practices that were seen as impediments to future growth and profitability. This case describes the design, development and deployment of one of the largest ERP implementations. The project required the implementation of standardized business processes and people practices for 30,000+ associates globally while minimizing the impacts on 1.3 million customers and on shareholders. Simultaneously, upper management set out on a strategy of creating a virtual business by outsourcing major business functions, including IT, Manufacturing and Distribution, and major parts of the sales and service operations. Other major events included the spin-offs of Lucent Technologies and Avaya.

6. TEACHING NOTES

Teaching notes for most of the cases presented in this issue and in other JISE issues will be available from the JISE web site (http://jise.appstate.edu). Teaching notes will be password protected. Instructors should contact the Editor (jise@appstate.edu) to obtain the password. Requests must be sent from a **college or university e-mail account** and must include a hot link to the college or university web site that verifies that the requestor is a member of the faculty. If a student is teaching a class and needs the teaching notes, the student must get a faculty member to request the password on the student teacher's behalf. Under no circumstances will the password be sent directly to a student.

7. REFERENCES

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8. ACKNOWLEDGEMENT

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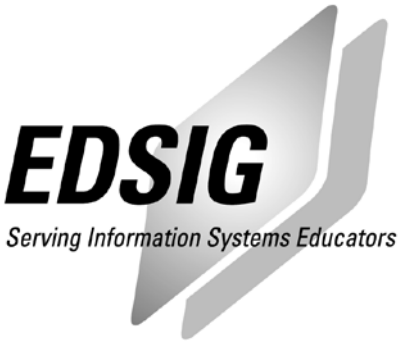

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